WHAT IS CLAIMED IS:

1. An interference microscope, comprising:
   - at least one specimen support unit;
   - a specimen being provided and associated with the specimen support unit and,
   - at least one planar area is provided for determination of an illumination state in the specimen in the interference microscope wherein the at least one planar area is a surface on the specimen support unit and is configured to be detectable by light microscopy.
2. The interference microscope as defined in Claim 1 wherein the microscope consists of a 4π microscope, a standing wave field microscope, a I^2M, I^3M, or I^5M microscope.
3. The interference microscope as defined in Claim 1, wherein a detector is provided which detects the light reflected from or induced at the planar area.
4. The interference microscope as defined in Claim 1, wherein the planar area, embodied in at least partially reflective fashion.
5. The interference microscope as defined in Claim 4, wherein the surface is coated.
6. The interference microscope as defined in Claim 5, wherein the surface has a defined reflectance that preferably is constant.
7. The interference microscope as defined in Claim 5, wherein the coating of the surface is configured in wavelength-dependent fashion so that light of at least one wavelength can be reflected.
8. The interference microscope as defined in Claim 5, wherein a metallic or dielectric coating is provided.
9. The interference microscope as defined in Claim 5, wherein a dielectric or metallic/dielectric hybrid coating is provided.
10. The interference microscope as defined in Claim 1, wherein at least one surface of the specimen support unit comprises at least one layer that can be excited to luminesce, in particular to fluoresce.

11. The interference microscope as defined in Claim 10, wherein the surface comprises several luminescent layers differing in their luminescent properties.

12. The interference microscope as defined in Claim 10, wherein the luminescent layer can be excited to luminesce with light of a light source.

13. The interference microscope as defined in Claim 1, wherein light is induced at a planar area of the specimen support unit by way of nonlinear processes.

14. The interference microscope as defined in Claim 13, wherein the nonlinear process is coherent anti-Stokes Raman scattering (CARS).

15. The interference microscope as defined in Claim 3, wherein the light reflected or induced at the planar area is detected with the detector of the interference microscope.

16. The interference microscope as defined in Claim 3, wherein the light reflected or induced at the planar area can be detected with an additional detector.

17. The interference microscope as defined in Claim 16, wherein the light reflected or induced at the planar area is, by means of an optical component, switched out of the detected or illuminating beam path of the interference microscope and conveyed to an additional detector.

18. The interference microscope as defined in Claim 17, wherein a glass plate, a dichroic beam splitter, a filter, a prism, a grating, or a spectrally sensitive arrangement is provided as the optical component.

19. The interference microscope as defined in Claims 15, wherein a pinhole is arranged in front of the detector.

20. The interference microscope as defined in Claim 19, wherein the pinhole is arranged in a plane corresponding to the specimen plane of an objective.

21. The interference microscope as defined in Claim 20, wherein the illumination or detection pinhole of the interference microscope is provided as the pinhole.

22. The interference microscope as defined in Claim 1, wherein at least one additional light source is provided as a laser for determining the illumination state in a specimen region of the interference microscope.

23. The interference microscope as defined in Claim 1, wherein the specimen support unit is fabricated of glass.

24. The interference microscope as defined in Claim 1, wherein the specimen support unit is configured as a cover glass.

25. The interference microscope as defined in Claim 1, wherein the specimen is arranged between two specimen support units.

26. A method for operating an interference microscope with at least one objective comprising the steps of:

- providing at least one specimen support unit associated with a specimen,
- positioning the specimen together with the specimen support unit in such a way that a planar area of the specimen support unit is located in the focus region of an objective of the interference microscope, and
- determining the illumination state in a specimen region of the interference microscope on the basis of at least one planar area of the specimen support unit.

27. The method as defined in claim 26, wherein the interference microscope is a 4π microscope, a standing wave field microscope, or I^2M, I^3M, or I^5M microscope.

28. The method as defined in claim 26 wherein the specimen support unit is configured as a surface.

29. The method as defined in Claim 28, wherein the determination of the illumination state in the specimen region of the interference microscope is accomplished on the basis of the light reflected or induced at the planar area, by the fact that an intensity signal profile is detected as a function of the axial position of the planar area.

30. The method as defined in Claim 29, wherein for detection of the axial intensity signal profile, the specimen together with the specimen support unit is moved along the optical axis of the objective or objectives; and the light reflected and/or induced by the planar area is detected in that context.
31. The method as defined in Claim 29, wherein several axial intensity signal profiles are detected at at least one point of the focal plane.
32. The method as defined in Claim 29, wherein several detections of axial intensity signal profiles are performed during a specimen detection.
33. The method as defined in Claim 29, wherein the detected axial intensity signal profile is evaluated using an algorithm.
34. The method as defined in Claim 33, wherein the algorithm determines the height of the signal at the center point of the intensity signal profile.
35. The method as defined in Claim 29, wherein the interference microscope is aligned as a function of the illumination state in the specimen region.
36. The method as defined in Claim 35, wherein alignment of the interference microscope is performed in such a way that constructive interference is present in the illumination focus, preferably using a corresponding control system.
37. The method as defined in Claim 36, wherein the alignment is accomplished by means of an optical path length change of an interferometer beam path segment.
38. The method as defined in Claim 36, wherein the detection and alignment operations are repeated and are coordinated with the drift behavior of the interference microscope.